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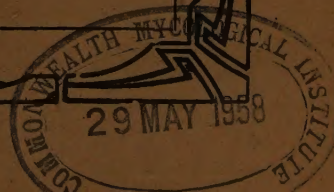
# Rubber Research Institute of Ceylon

Combined 3rd & 4th Quarterly Circulars  
for 1957



December, 1957

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# Rubber Research Institute of Ceylon

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## **N O T I C E S**

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### **DARTONFIELD GROUP—VISITORS' DAY**

Those who wish to visit the Institute are requested to do so after making an appointment. No special days are set apart as Visitors' Days and the services of the technical officers can be availed of for discussion or demonstration only by prior appointment.

### **PUBLICATIONS**

Rubber Research Institute publications comprising Annual Reports, Quarterly Circulars and occasional Bulletins and Advisory Circulars are available without charge to the Proprietors (resident in Ceylon), Superintendents and Local Agents of rubber estates in Ceylon over 30 acres in extent. Advisory Circulars and Smallholdings Leaflets in English or Sinhalese will be available without charge to Smallholders on application. Forms of application can be supplied on request.

It will be appreciated if subscribers will return any back publications which are of no use to them.

### **ADVISORY CIRCULARS**

The undernoted Circulars may be obtained on application at 30 cents per copy. Future issues in the series will be sent free of charge to estates and smallholders registered for the receipt of our publications:—

- (5) Straining box for latex (January, 1940).
- (12) Warm Air Drying House for Crepe Rubber (Reprinted 1952).
- (33) Mechanical Felling of Rubber Trees (Reprinted March, 1955).
- (37A) Manuring—Magnesium Deficiencies in Rubber (July, 1954).
- (37B) Potassium Deficiencies (September, 1954).
- (38) Planting and After-Care of Budded Stumps and Stumped Budgrafts (Superseding Circular No. 8) (March, 1953).
- (39) Clonal Seed as Planting Material (Superseding Circulars No. 26 and 27) (July, 1953).



- (40) Tapping of Hevea Rubber (Superseding Circulars No. 17 and 34) (June, 1954).
- (41) Pink Disease (June, 1954).
- (42) Sale of Budwood (June, 1954).
- (42A) New Local Planting Material for Small Scale Trials on Estates (July, 1955).
- (43) Oidium Leaf Disease (Superseding Circulars No. 22 and 28) (June, 1954).
- (44) Diplodia Dieback and Collar Rot of Hevea and Blue Spot of Crepe Rubber (June, 1954).
- (45) Phytophthora Leaf Disease and Stem Dieback of Hevea (October, 1954).
- (46) White Root Disease of Hevea (Leptoporus Lignosus=Fomes Lignosus) (October, 1954).
- (47) Ustulina Rot of Rubber Trees (November, 1954).
- (48) Brown Root Disease of Hevea (October, 1954).
- (49) Root Disease in Replanted Areas (Superseding Circular No. 31) (October, 1954).
- (50) Orange Gall of Hevea (December, 1954).
- (51) Bird's Eye Leaf Spot of Hevea (December, 1954).
- (52) A Guide to the Cost of Replanting Rubber (December, 1954).
- (53) Prevention of Coagulation in the Field (Superseding 2nd Supplement to Advisory Circular No. 17) (March, 1955).
- (54) Bark Rot and Canker of the Rubber Tree (Superseding Circular No. 21) (July, 1955).
- (56) Cover Crops (Superseding Circular No. 25) (October, 1955).
- (57) Notes on Rubber Seedling Nurseries (Superseding Circular No. 35) (October, 1955).
- (58) Notes on Budgrafting Procedure (Superseding Circular No. 1) (December, 1955).
- (59) Manuring of Rubber (Superseding Circular No. 37) (June, 1956).
- (59A) Magnesium Deficiencies. (April, 1957).

### **CLONES RRIM. 500 SERIES**

The owners of the above clones (Rubber Research Institute of Malaya, P.O. Box No. 150, Kuala Lumpur, Malaya) have authorised the re-sale of material of these clones in Ceylon without agreement.

The agreements already signed in respect of budwood of these clones purchased from this Institute should therefore be regarded as cancelled in so far as re-sale within Ceylon is concerned.

*Received in March, 1957.*

## INTEGRATION (CENTRALISATION) OR DISINTEGRATION (FRAGMENTATION) FOR RUBBER ESTATES IN CEYLON

By

**E. J. Risdon, *Chemist*, and C. D. de Fonseka, *Administrative Secretary***

### **A. Procedures Used:**

**1. Introduction:** Earlier articles in this Journal (2) have made passing reference to the attractive features of centralisation of manufacture, *e.g.* greater uniformity in visual appearance in the case of latex crepes and greater technological uniformity both within and between days for sheet and latex crepes when the manufacture is properly organised, but we would not wish to underemphasise the technical and more particularly the administrative difficulties of really large scale centralisation when the management of the central factory and of the Estates contributing latex to this factory are not responsible to the same Proprietors. More recently our attention has been drawn to a slightly different aspect of this subject when the R.R.I.C. was asked to place its views on fragmentation of Estates before an appropriate committee appointed by the Government of Ceylon. While this Institute's views in the latter connection cannot be the subject of public discussion it is thought that certain of the data produced for this purpose might be of general value not only in Ceylon but also in Europe; where it would appear that the Boards and Proprietors of certain Companies have been subjected to considerable pressure by interests which seemed to be primarily concerned in the acquisition and use of the liquid assets of the companies, and where the attempts by various Boards to place certain liquid assets, held primarily for replanting and other purposes, beyond the immediate reach of both the Proprietors and other interests have not been particularly successful.

The principal object of this article is, therefore, to refocus attention on certain aspects of the relationship between yield per acre, selling price of the product, type of management, size of the Estate and the operational costs which, for this purpose, include the cost of production together with depreciation, rejuvenation and dividend provisions. The authors of this article wish to make it quite clear that they do not consider themselves particularly well qualified to make a survey of this nature as they do not operate wholly commercial rubber estates in Ceylon; but, they do feel that the methods employed and the tentative conclusions may be of some value to those who have more reliable data or who prefer alternative assumptions or predictions. In the latter connection it should be fully understood that for the purpose of this article highly accurate present day cost data are of relatively much less value if predictions of future trends in costs and in selling prices do not have the same precision—and, in our present opinion it is, perhaps, unlikely that they will.



**2. Product Selling Price:** Probably the most important variable is product selling price and for this purpose we propose to ignore sole crepe on the grounds that when the premium is inadequate Estates can turn to blanket and in many cases to sheet. The rapid developments already found, or to be reasonably anticipated, in synthetic rubbers, etc. outside the Iron Curtain countries and the slowed rate of expansion of natural rubber production, (due to extensive replantings, mainly in Malaya and Ceylon, which are not yet in economic production) suggest that in spite of the various predictions about the demand for rubbers it might be advisable to presume that natural rubber prices will eventually be largely stabilised by the price of synthetic rubbers and plastics. In the latter connection it might be appropriate to assume that S.B-R (G.R-S) will be available at 23-26 cts. (U.S) and that the cost of synthetic polyisoprene (synthetic natural rubber) may not be above about 30 cts. (U.S) in really large volume production. It is also advisable to note that certain technical sources expect even cheaper high quality rubbers to be available as a result of recent work on new polymerisation procedures, and on this basis we are at present reluctant to consider a ceiling price for best quality natural rubber (other than sole crepes) above about 20 cts. (U.S).

Allowing for (a) scraps at lower price, (b) a nominal percentage of off-grade latex rubbers, (c) the research, control and medical cesses, (d) transport (internal and ocean freight) costs and packer's margin and for (e) a relatively small cess for general revenue purposes, an average selling price of not more than 85 cts. (Ceylon) might have to be met. (No provision is made for a heavy replanting cess as it is assumed that efficient economic units will do their own replanting although part of the necessary provision in Section 3 below could be retained by Government and distributed evenly on a per acre basis, if the managements of the units fail to make the relevant provisions in their own accounts). Although 85 cts. is proposed as the average selling price, alternative prices are also considered for reference purposes but we would not at present advocate their use for official or policy purposes.

**3. Annual Charges:** Before attempting to assess the cost of production of Estates or Small-holdings under different types of management it is appropriate to consider certain charges which we have called—perhaps misleadingly—annual charges. Thus, we consider that the return which the owner of the Estate will expect to obtain from the capital invested **must** be allowed for in the calculations on the grounds that unless such provision is made the Estate might be mismanaged in order to obtain this return. For this purpose we propose to assume that newly established units will have an average capitalisation of about Rs. 1,800/- to Rs. 2,200/- per acre requiring a return of, say, Rs. 185/-/acre/year. (In the case of older established units the book capitalisation is sometimes very much less and a return of, say, Rs. 85/-/acre/year might appear more suitable, but this arrangement does not take into account the retained profits which have increased the value of the Estate but not its book capitalisation. This procedure is used in estate management type No. 1A of Tables No. 1 and 2).

We have also implied that provision must be made for an annual contribution to a replanting reserve. For Estates and Small-holdings employing hired labour we propose the following assumptions: (a) replanting costs of old seedling and of the older budded rubber areas will rise to about Rs. 2,100/- per acre, (b) about 7 years must be expected to elapse between the cessation of tapping in the old stand and the production of a useful yield by the new stand and (c) slow deterioration in tapping and maintenance standards and gradual devitalisation will mean that the useful life, beyond the first 7 years, will not exceed about 21 years. The implication of (b) and (c) above is that on the average 25 per cent of the planted area will be out of tapping due to immaturity, or that such proportion of this 25 per cent that is in



tapping will not only not be giving an economic yield but, on the average, will be giving a yield which does not appreciably exceed the cost of tapping in the areas involved. In this connection it should be mentioned that our tapping cost calculations do not take account of this 25 per cent of the total planted area. We fully appreciate that a figure of 25 per cent may be accepted only with reluctance and with some reservations, but we are obliged to point out that the minimum economic yield at the selling price which is, in our opinion, appropriate in many contexts is not low and that the useful life of the older budded rubber in terms of such selling prices is not generally considered to be precisely defined. The Department of Census and Statistics in Ceylon in its 1952 review (1) assumes that the economic life of a rubber tree is 30-35 years of which the first 6 or 7 are unproductive and on this basis concludes that at any one point of time a minimum of 18 per cent of the planted area will be immature. We prefer a figure of 25 per cent because we are thinking primarily in terms of (a) the older budded rubber (which may have been seriously devitalised by disease, etc.) rather than the possibly more sturdy old seedling trees and of (b) relatively low product selling prices and gradually increasing operational costs coupled with lowered operational standards—all of which will be expected to reduce the useful life of the tree. While we realise that a figure of 18-20 per cent may be preferred in a number of cases, we would be reluctant to approve any such downward revision, at least for purposes of Government or Company policy, without a large volume of highly accurate data. On the basis of these assumptions the allocation to replanting reserves would be Rs. 75/- /acre/year.

In the same terminology provision ought to be made for the depreciation (replacement) of buildings and equipment (*i.e.* including factory equipment, vehicles and dusting machines, etc.) and for additional buildings and equipment to deal with the heavier factory loads as yields increase with successive replantings. It is not easy to assign a suitable figure for this purpose, but for many types of Estates we propose to use Rs. 20/- /acre/year.

**4. General Cost of Production (C.O.P.) Items:** We have indicated in Section No. 1 above that exact C.O.P. figures may, in this context, be of limited value if they are unaccompanied by equally reliable predictions of cost trends and we have also implied that we doubt whether predictions of future cost and selling price trends will necessarily be equally reliable. We propose to use this uncertainty as an adequate excuse for subdividing items, which we believe should be considered under this heading, into 2 major classes; *viz.* expenditure which, for a given type of estate management, is substantially constant, and expenditure which, within the limits of reasonable error, can be assessed on a per acre basis. In the former category we would place supervision charges and in the latter general C.O.P. items including tapping costs.

Table No. 1

ate etc. Management Type: Name Number	Large Estates 1      1A		Medium Size Estates 2	Small Estates 3      3A		Small-holdings 4
Supervision Type	Usual Estate Office		Usual Estate Office	Conductor/K.P.		Payment to 2 labourers
Cost per year Rs.	40,000/-	40,000/-	30,600/-	2,000/-	3,000/-	500/-
Annual Charges per Acre per year Rs.	280/-	180/-	280/-	270/-	270/-	270/-
Tapping Charges per Acre per year Rs.	168/75	168/75	168/75	100/-	120/-	80/-
General C.O.P. charges per Acre per year Rs.	240/-	240/-	216/-	150/-	200/-	100/-



The assumptions used in this and in the preceding Section are summarized in Table No. 1. Supervision charges for type 2 Estates are on the basis of Superintendent Rs. 1,500/-, Clerks Rs. 500/-, Conductor Rs. 300/- and Rubber-maker Rs. 250/- per month; for the larger type 1 and 1A Estates the allowances for salaries and the number of staff is rather more generous; for type 3 and 3A Estates control by a Conductor or K.P. is assumed, and for type 4 Estates a nominal extra payment is made to 2 labourers. The annual Charges (Section No. 3) for types 1 and 2 Estates are on the basis of Rs. 280/- /acre/year (*i.e.* Rs. 185+75+20); for type 1A Estates these charges are Rs. 180/-, assuming a lower and artificial book capitalisation; while for types 3, 3A and 4 Estates the depreciation allowance has been halved. Tapping charges for types 1, 1A and 2 Estates are on the basis of 2 acres of mature rubber per tapper per day for a total of 300 days on tapping accounts at a rate which will in due course be equivalent to Rs. 3/- per day and for this purpose the area of mature rubber is defined as 25 per cent of the total planted area. This figure is very obviously open to criticism on the grounds *inter alia* that 300 days is excessive in many (but not all) districts. Tapping charges for type 3 and 4 Estates are computed at a much lower figure on the grounds that either the size of the Estate will be insufficient to compel compliance with minimum wage ordinances or certain dodges might be used to avoid payment according to the ordinances. The general C.O.P. charges (last line of Table No. 1) are, in effect, those (revenue) charges not covered by any of the above and have been computed in the case of type 2 Estates on the basis of data believed to be applicable to a particularly efficient Estate of this classification. The Estate in mind is, by Ceylon rubber standards, a little above medium size, is substantially replanted (but still has significant proportions of old seedling and of immature rubber) and operated to the year ending 31-3-56 at an overall C.O.P. (revenue account) of about 60 cts per lb. In our terminology, the general C.O.P. charges would appear to be nearly 15 per cent under the Rs. 216/-/acre/year proposed in Table No. 1. This figure has been further inflated in case of type 1 Estates and considerably reduced in the case of type 3 and 4 Estates on the grounds that the former may be less favourably placed in terms of location, terrain, labour utilisation, sundry fees, etc. and that the latter type of Estates may be able to circumvent the various ordinances, will be less heavily roaded etc. and may not invariably be expected to maintain the same agricultural standards.

## B. Application of the Assumptions

**5. Minimum Economic Yield:** Using the assumptions summarised in Table No. 1, we have calculated in Table No. 2 a figure, in lbs. of rubber per acre per year, which we have called the minimum economic yield corresponding to the various systems of estate management and product selling prices. The term minimum economic yield may be a little misleading as the figure is actually the approximate yield per acre required to cover all the charges which we have assessed on a per acre basis and does not therefore include supervision charges. The relevant formula is, therefore:

$$\text{Minimum Economic Yield (lbs./Acre)} \times \text{Average Selling Price} = \text{Annual} + \text{Tapping} + \text{General C.O.P. Charges per Acre.}$$

Thus, for type 1 Estates the per acre charges on the right hand side of the equation above amount to Rs. 688/75 per acre per year and at a selling price of 85 cts per lb. these charges are not covered at an overall yield below about 810 lbs./acre.



Table No. 2

Selling Price (Ceylon Cents)	Approximate Minimum Economic Yield (lbs./Acre) for Management Types No.					
	1	1A	2	3	3A	4
85	810	693	782	612	694	529
95	725	620	700	547	621	474
105	656	561	633	495	562	429
115	599	512	578	452	513	391
125	551	471	532	416	472	360
135	510	437	492	385	437	333

The marked dependence, with our assumptions, of the minimum economic yield upon the average selling price for a given type of estate management is apparent from Table No. 2 and particular attention is drawn to the lower minimum economic yield to be found at a given fixed selling price with Small-holding type 4 management. The implication that this type of management is best suited to weather times of low price is only correct if the trees will survive with the lower standard of maintenance postulated and it should not be forgotten that as the minimum economic yield is lower the incentive to replant, and thereby maintain the national income, might well be rather low.

**6. Replanting:** The comments given in the first paragraph of this article suggest that we have the impression that there may still be a few Proprietors (*i.e.* Proprietary Planters, Stockholders or Shareholders) who favour a "go slow" policy in respect of the replanting of old seedling and that there may be rather more who are of the opinion that once the present round of replanting is completed, *i.e.* the old seedling is replaced by, usually, a mixture of comparatively old and relatively newer clones, further replanting will be unnecessary. Against this we have postulated that the useful life of the tree (old budded rubber) should be set at about 28 years, and although we did not precisely define the term useful life it was apparent that we were thinking in terms of low selling prices and high minimum economic yields. If reference is made to Tables No. 1 and 2 it will be seen that the minimum economic yield of a type 1 Estate which does not make or which ceases to make replanting or depreciation provisions is substantially similar to the figures given in Table No. 2 for a type 1A Estate. As we understand that well preserved old seedling will often give yields upto 500 lbs./acre it is immediately apparent that in times of high prices the incentive to replant is not necessarily very high, in so far that the minimum economic yield necessary to give a return of Rs. 185/- /acre/year can be attained without undue difficulty. But in times of low average selling prices, and we are primarily interested in such conditions, the minimum economic yield approaches 700 lbs./acre—a figure which is, we presume, generally unattainable with old seedling alone. These comments and the fact that it is only in times of low price (when money is relatively in short supply) that the results of replanting are needed, are, of course, appreciated by the majority of Proprietors, but what may be less readily appreciated is that when replanting at the suggested rate is in full swing then the minimum economic yield at a low selling price rises to just over 800 lbs. per planted acre, or, alternatively, the yield per mature acre must be in excess of about 1,067 lbs. We understand that there are in Ceylon appreciable areas of older (1926-1940) budded rubber which are giving yields in the range 800-1,000 lbs./acre/year, and, although this may be highly satisfactory under present conditions, we have indicated conditions under which such yields might not be particularly attractive. Stated in a slightly different manner our implication is that under conditions of relatively

high (or at least not too low) average product selling price the useful life of older budded rubber might be prolonged (as a result of the low minimum economic yield) by extra careful maintenance, the use of stimulants or by a period of tapping high up (ladder tapping). However, under conditions of low average selling price, the useful life of the older budded areas might not be above the 7 + 21 years suggested in Section No. 3.

Arising from these comments it will be apparent that (a) any official Company Board policy of implying to the Proprietors substantially increased dividends for a long period of time once the first round of replanting is completed could be misleading, and that (b) any suggestion that Planters will be well satisfied with new clearings which eventually give only 1,000 lbs./acre/year could be ill advised. This subject is of obvious topical interest to the R.R.I.C. also, as the Rubber Research Board has recently requested the planting organisations in Ceylon to recommend very strongly to Government a substantial increase in the research cess in order that the R.R.I.C. shall *inter alia* be in a position to develop and/or test, under a variety of conditions, clones with a yield potential far above the 1,000 lbs./acre stated above.

**7. Minimum Economic Unit:** In previous sections we have utilised the concept of minimum economic yield, *i.e.* the yield in lbs./acre needed at a fixed average selling price to cover the charges assessed in Table No. 1 on a per acre basis, and we propose now to use the concept of minimum economic unit which is the minimum size of an Estate or Small-holding necessary at a given selling price and type of management to cover all the charges shown in Table No. 1. The relevant figures are given in Table No. 3 below.

**Table No. 3**

Estate Management Type No.	1						2						
Average Selling Price (cts.)	85			95			85				95		
Approximate Minimum Economic Yield	810			725			782						
Actual Average Yield (lbs/acre/year)	850	900	1,000	750	800	900	800	850	900	1,000	750	900	900
Minimum Economic Unit (Acres)	1,185	525	248	1,683	561	241	2,007	530	305	165	641	321	161

Estate Management Type No.	3A						4	
Average Selling Price (cts.)	85			95			85	
Approximate Minimum Economic Yield	694			621			529	
Actual Average Yield (lbs/acre/year)	750 800			650 700 800			600 700	
Minimum Economic Unit (Acres)	63 33			109 35 18			8 3	



The dependence, with our assumptions, of the size of the minimum economic unit upon the difference between the actual and the minimum economic yield is apparent from Table No. 3 and in the two subsequent sections of this article we propose to deal briefly with certain comparisons within Estate types, *viz.* centralisation, and between Estate types, *viz.* fragmentation.

**8. Fragmentation:** The purchase and division into small lots of type 1 or 2 Estates has for some time been viewed with alarm by Government and by many private citizens and bodies, apparently mainly on the grounds that the new owners of the productive rubber lands may have neither the desire, the ability nor the time to treat their property as a national asset also. It is apparent that if fragmentation is to be a success on a national basis not only must the new owners have the desire and ability, etc. to consider the property on a long term basis but in addition the size of the units must be economic. In terms of our Tables No. 2 and 3 the implication is that it is necessary to decide (a) which form of management or Estate type is at present, and for some time to come, most likely to meet the national economic and political needs, (b) what average selling price shall be assumed and (c) an appropriate average yield.

We have already suggested that for official purposes the average selling price should be fixed at not more than 85 cts. per lb. and we now propose that management system type 2 may have to be considered as most satisfactory in this context. This system does not envisage the most expensive form of supervision but does carry provision for the usual Estate Office and Assistant Staff supervision and control; the annual charges provision does not presume that the Estate will be acquired or capitalised at an abnormally low figure corresponding to depression prices or at specially depressed prices, and adequate provision has probably been made to maintain the unit in at least a fair agricultural state. We realise that management types 3 and 4 may be politically attractive, but we are obliged to stress that the rather arbitrary costing data used in these cases involve (a) rather low general C.O.P. and supervision charges corresponding to a lowered standard of supervision and agricultural management and (b) rather low tapping charges corresponding to either evasion of the minimum wage ordinances or to 'family' tapping. We have already noted that these forms of management might have an adverse effect on the national income, and, until we can be assured that (a) the average yield and product selling price obtained by this small type of Estate or Small-holding will invariably be sufficient to allow it to be run in accordance with all the relevant ordinances and at a good standard of agricultural practice and that (b) adequate provision is made to compel such compliance with the ordinances and with the standard in mind, we would be reluctant to consider these systems of management as a major feature of official policy. We do not, however, wish to suggest that management by a resident, **suitably experienced** sole Proprietor is necessarily unattractive and we would mention that with supervision by the owner *gratis* together with a nominal additional payment of, say, Rs. 300/- per annum to a working K.P. (and other charges as indicated by type 2 Estates) the minimum economic yield is given by the fourth column of Table No. 2 and for a product selling price of 85 cts. at an average yield of 800 lbs./acre the minimum economic unit is about 20 acres. The difficulty with this form of management is that of ensuring that the Proprietor will comply with all our assumptions. One additional factor in connection with type 4 management is that, although at an average yield of 700 lbs./acre the minimum economic unit is only 3 acres, the annual income to the owner would be only Rs. 555/- (*i.e.* Rs. 185  $\times$  3) which does not compare at all favourably with the income of tappers on types 1 and 2 Estates.

We have already suggested (a) 85 cts as the selling price and (b) Estate type 2 management and we now propose that the average yield should not be assessed above 850 lbs./acre. By definition this figure will be the overall yield of the Estate of which 25 per cent will be either immature or contributing substantially less than 850 lbs./acre to the annual crop, so that this figure is equivalent to an average of about 1,133 lbs./acre from mature areas when 25 per cent of the cultivated area is out of tapping and rather less when part of this 25 per cent is still in tapping and giving a yield which more than covers the tapping costs. We appreciate that this figure also is necessarily somewhat arbitrary but we consider that at the conclusion of the present cycle of replanting the majority of the well maintained areas which are not 'diluted' with a high proportion of older budded rubber may well have an average potentiality at least in the range 1,100-1,200 lbs./acre. This corresponds to a minimum economic unit of about 530 acres.

**9. Centralisation:** In the previous section we have indicated that on the basis of our assumptions there is some justification for fixing the minimum economic unit for fragmentation purposes at about 530 acres. We realise that at a later date there may be adequate justification for the official encouragement of type 3 and 4 Estates in this connection, but the printed comments of associations which include a number of inspectors or visiting agents under the Replanting Subsidy Scheme do not suggest that such encouragement is at present wholly justified. To overcome the possible political objection that retention of relatively large units seriously limits the extent of land ownership we can only suggest the possibility of requiring all fragmented units to be organised as limited companies with shares of low denomination which should be available on the local stock exchange. A scheme of this type could, perhaps, have the added advantage that it might be possible to avoid the deterioration of Estates which is sometimes found when the sole Proprietor dies intestate, when the division of the property is the subject of protracted litigation or when the heirs to the property attempt to meet Estate Duty charges by 'running down' the property.

The minimum economic unit is also of interest in connection with the size of current Estates. Thus, one of the tables compiled by the Department of Census and Statistics in Ceylon in its 1952 review (1) suggests that of the rubber reported on Estates in 1951 the proportions forming individual units of 100-199, 200-499, 500-999 and 1,000 or more acres were approximately 9, 20, 24 and 30 per cent respectively. The conclusion which we have drawn from the data is that over 50 per cent of the rubber acreage on Estates, for which details were available, was organised in units of sizes between 100 and 1,000 acres in extent. On the basis of the data and views in Table No. 3 and in the preceding section it will be apparent that in our present opinion the minimum economic unit for type 1 and 2 Estates would be about 1,185 and 530 acres respectively, so that there is a possibility that there may still be Estates which are inappropriately organised, *i.e.* too small, to resist periods of low average product selling price. We realise that many Estates in the range 100 to 499 acres and possibly a few near the 1,000 acre mark are run essentially as type 3 or 3A Estates, *i.e.* under Conductor/K.P. or Proprietor management with relatively low operating, etc. costs, and according to Table No. 3 such Estates with their relatively low minimum economic yield, (and a minimum economic unit below 100 acres for average yields at about 750 lbs./acres) are theoretically well placed to survive in times of low selling prices. However, as we have indicated above the success or failure of such Estates will depend very largely upon the integrity and ability of the individual managements.



**10. Summary:** In this article replanting, fragmentation and centralisation are discussed in terms of the concepts of minimum economic yield and minimum economic unit by making certain assumptions concerning the average yield per acre, the average selling price of the product, the type of management and the operational costs. A detailed explanation of the assumptions is given together with a clear indication that the assumptions are not considered to be more than tentative.

**Note by Editor:** This article is an extension and amplification of a lengthy internal memorandum produced by the first author in response to my request for certain information bearing on the subject of fragmentation of Estates. Due to circumstances beyond my control, publication of this article has been delayed until a time when fragmentation is not quite so topical. However, it is felt that this outline and extension of the procedures and assumptions used may be of value to those whose responsibility it is to make formal policy decisions on the subjects discussed by the authors—E.D.C.B.

#### **LITERATURE:**

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# WEEDKILLING IN HEVEA

By

**D. H. Constable**

The R.R.I. has, for the last 3-4 years, been actively investigating the question of weedkilling in Hevea clearings in Ceylon.

It is generally conceded that a ground cover is essential in clearings particularly when they are young and much of the soil is completely exposed to the elements. It is also of general acceptance, **that where possible**, a creeping legume is the most desirable form of ground cover. Unfortunately, due to competition with strongly established grasses and Compositae, it has not always been a reasonable economic proposition to persist with a legume cover and such alternatives as **Mikania scandens** have had to be accepted and even endorsed in such cases. There is no doubt that by vigorous hand weeding and scraping such competition might be overcome but the cost is high and the effect on soils already heavily eroded is disastrous, while the period during which the loosened soil is fully exposed to rain is likely to be six months or more.

The problem then is to cultivate the land—

- (a) to the detriment of the existing 'weed' population;
- (b) to the benefit of the cover crops to be established;
- (c) without harm to the young hevea;
- (d) without causing excessive susceptibility to erosion.

While in connection with this it must be remembered that Ceylon rubber land is, in general:

- (1) Very steep
- (2) Very rocky
- (3) Very broken and uneven and relatively difficult to traverse even on foot.

The possible methods of weed control are as follows:—

- (a) Hand cultivation (Hoeing, scraping, mamoty, etc.).
- (b) Mechanical cultivation (Plough, rotary hoe, etc.).
- (c) Direct burning (flame thrower, firing land when dry).
- (d) Chemicals divided into—
  - (1) Soil Sterilisation.
  - (2) (a) Non selective herbicides
  - (b) Selective herbicides.

Considering each of these in turn in relation to our problem:

- (a) Hand cultivation.—Is completely effective but very often expensive and causative of severe erosion.



- (b) Mechanical cultivation.—Virtually impossible owing to the type of land. In those few areas where the flatness of the soil is sufficient to permit mechanical cultivation the amount of rock superficial and immediately subsurface makes it impossible.

This in its turn rules out quite a number of chemicals which are used in conjunction with ploughing and which are not reasonably efficient without it.

- (c) Direct burning.—Except for opening new clearings ordinary burning is not practicable and in any case is a most undesirable practice. A number of agricultural flame throwers are available and two have been tested and found unsatisfactory for this particular purpose.

They are in general much too heavy for use except on wheels or on flat farmland. The use of wheeled carriers is impracticable in our conditions. Also as the flame area is very small and requires an appreciable period of scorching to kill vegetation, the speed of working is likely to be measured in days per acre rather than *vice versa*. The flamethrower appears suitable for roads, nurseries and row plantings where it is only necessary to clear 6-12" width along each row.

This brings us to:

- (d) Chemical weedkilling. The particular advantage of which is that nothing is lost and there is no soil disturbance. The existing plants are killed and their remains form a protection to the soil surface while their roots continue to bind the soil.

Later as they rot down they form a residue of organic manure on which the growing cover crops can feed. The transition is thus made with the minimum of interruption and with some advantage in the form of plant residues as nutrient material.

- (1) Soil sterilisation. Soil sterilants vary greatly in their degree of persistence and will also vary according to the type of soil, degree of leaching, etc. Soil sterilisation is not useful for our purpose since it would present the establishment of the cover crop and would possibly damage the young rubber. Sodium Arsenite is one of the sterilants of particular interest since it is used in rubber clearings particularly in Malaya. We do not recommend it because of its poisonous character and difficulties in supervising its proper use. We also understand that in Malaya the general recommendations for its use are being modified and caution suggested in its use on a number of soils where the sterilant action appears to have a marked effect on Hevea.

- (2) (a) Non selective. Apart from the sterilants the following are non selective herbicides.

Monuron (CMU)  
Maleic Hydrazide (MH)  
Pentachlorophenol (PCP)  
Trichloroacetic Acid (T. C. A.)  
Dalapon (Dowpon)

Amizole  
DNOC  
Mineral Oils  
Tar Oils

Many of these have been tested and the results will be discussed in a later section.

(b) Selective. These are the compounds now widely known as—

2, 4-D  
2, 4, 5-T  
MCPA  
MCPB  
DNC

With one exception these have not proved satisfactory. They are not for the most part antagonistic to the grasses while DNC and its derivatives are too poisonous for our conditions.

Before going on to consider the results achieved under (d) 2(a) there are two further and related matters to be considered, namely rates of application and economics.

Application is a most difficult problem since it requires even movement across the ground and consistent spraying. Since the spray operator is scrambling through drains, fomes pits, over rocks and over tree trunks every few yards, it is quite impossible to achieve even coverage in the majority of cases. Also the extremely varied "weed" population met has differing susceptibilities to the materials used. The criterion aimed at was to distribute 40 gallons of spray mixture on an acre as being the best compromise between sufficient liquid for good coverage and at the same time reasonable amounts to transport. Even spraying has been greatly improved by the use of a boom sprayer (which it is believed will be commercially available) fitted to an ordinary knapsack sprayer and giving an 8 foot wide path continuously.

Also a stainless steel knapsack sprayer has been employed which presents considerable advantages for cleaning and maintenance.

The use of the boom sprayer has afforded further possibilities of achieving economy in cost. If weedkilling (spraying) is postponed till planting lines have been marked out then the operator can walk down each line in turn giving a sprayed strip. If this is done properly the resulting clean area is quite sufficient for the establishment and encouragement of cover crops.

As the boom extends to one side of the operator two techniques are possible.

In both cases **before** planting Hevea

- (a) Walk down each line in turn keeping roughly four feet from the centre line. Thus giving a strip 4 feet wide either side of the planting line.
- (2) Walk down the planting line to the end, about turn and come back down the **same** planting line. Thereby spraying 8 feet either side.



The second method will require twice the material but will give wider cleared strips. In  $24' \times 10'$  planting for example only  $\frac{2}{3}$  of an acre will have to be sprayed for every acre of ground, and the sequence will be: planting line, 8 foot sprayed, 8 foot 'weeds', 8 foot sprayed, next planting line, 8 foot sprayed, and so on.

In our opinion strip spray weeding based on one or two strips per planting line is the most efficient (as well as the most economic) way of working, since attempts to, obtain 100 per cent coverage invariably lead to double and sometimes treble spraying.

Those who wish to do 100 per cent clearance are recommended to do it in two parts (1) Double strip spray (2) Wait till the results of (1) are apparent (3) repeat the spraying on the unsprayed areas only.

Turning now to the economics we have been quoted acceptable costs varying from Rs. 25/- to Rs. 75/- per acre by various Agencies. In addition we know that in stubborn cases estates are spending up to Rs. 150/- per acre on the re-establishment of cover crops. We have therefore taken as our goal Rs. 50/- per acre for material. For labour, with a boom spray, one man should do 2-4 acres per day so that cost is negligible.

We have therefore ruled out materials with an expected cost approaching Rs. 100/- per acre. For cheaper materials likely to be a little over Rs. 50/- per acre we have investigated lower concentrations and/or less spray but in general this is false economy and may lead to a complete respraying. The use of strip spraying which at 2 strips per line achieves 30 per cent economy on  $24' \times 10'$  or 45 per cent economy on  $30' \times 8'$  seems to be a more satisfactory way of bringing down the cost.

We now come to a consideration of the chemicals commonly available.

The following have not been tested owing to cost and/or highly poisonous nature.

CMU, MH, DNC and derivatives, T.C.A.

The following proved ineffective against grasses on their own—

2,4-D, 2,4,5-T, MCPB, MCPA.

The following were tested and some success achieved—

Pentachlorophenol (PCP)  
P.C.P/2,4-D ("Dipentox")  
Dalapon ("Dowpon")  
Amizole ("Weedazol")  
Amizole/PCP

Trials with some of all of these materials have been carried out on Ederapolla, Elpitiya, Gallawatte, Kepitigalla, Pimbura and St. George. Results have varied according to the conditions and species sprayed and it is not proposed to go into each trial. Instead the work is summarised in chronological order.

Work was commenced at Ederapolla using 2,4-D, 2,4,5-T, MCPA, and Pentachlorophenol. Some effect was achieved by the latter but also a considerable degree of skin irritation to the labourers.

Further trials were held up due to the difficulty of assessing probabilities of fine weather at a point 75 miles away, and finally operations were shifted to the Kalutara District. The need for 24-36 hours fine weather was emphasised during this phase.

Further tests eliminated the phenoxyacetic acids and then "Dipentox" and Amizole became available. The former was of particular interest owing to its P.C.P. content and proved to be moderately effective at rates of about 4 galls. material/per 40 gallons mixture/per acre. Amizole had been dismissed when suddenly 3-4 months after application the Amizole sprayed area turned white and a highly effective kill was obtained. Two drawbacks were inherent namely the relatively long time to achieve results and a probable cost of Rs. 60-75/- an acre. Further trials confirmed the first result, and that "Dipentox" was also reasonably good.

At this stage our supplies of "Dipentox" ran out and efforts were made to reproduce its effect using 2,4-D, 2,4,5-T and MCPA with Pentachorpol. Some commercial trials were done at the same time all with no effect.

A trial was then made with an Amizole/PCP mixture which proved most effective. "Dowpon" then became available and comparative trials were made with this material, with Amizole/PCP, and with Sovacide. The Amizole/PCP mixture proved the best giving both kill, and leaving the area clean, for a considerable time. Dowpon achieved a good kill but did not appear to be lasting. In further trials the lasting effect of the AM/PCP mixture was most noticeable. Other trials with Dowpon appeared to be more successful than previously, while using the Am/PCP mixture in other areas gave similar varying results. A further supply of "Dipentox" was received and also proved satisfactory though a second spray was sometimes necessary.

The situation therefore may be summed up as follows:—  
We have three sprays:

"Dowpon" (10-15 lbs./per 40 galls. per acre)

"Dipentox" (4 galls. active material/per 40 galls./per acre)

"Am/PCP" (2-4 lbs. Weedazol + 3 galls. Shell P12/per 40 gall./per acre).

all of which are, or are likely to be, commercially available and which between them will eradicate most of the grasses and other plants to be found in newly felled old rubber clearings. Of these Am/PCP is probably the most successful if it is effective under local conditions but in every case trial sprayings are recommended to see which compound is most suited to the particular conditions.

### Recommendations

(1) Dowpon

Dipentox

Am/PCP

are recommended for use in eradicating grass prior to replanting

(2) A boom sprayer should be used.

(3) Strip spraying may be done and will result in considerable economies in material.



(4) When making up spray mixtures use a quantity of Teepol, Lissapol, or other surface active agent to aid mixing and facilitate spreading on the leaf.

(5) Dipentox and Am/PCP are mildly poisonous and irritant, care should be taken not to spill the concentrated material on skin while mixing and dusting goggles should be worn. Immediately wash off **concentrated** material.

The diluted material is mildly irritant. Clean splashes off the sprayer before carrying it and wash legs and feet after walking through vegetation which has been sprayed.

### ACKNOWLEDGMENTS

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Also Messrs. R. J. S. Bean, K. Busby, J. Burgess, C. F. Burrows, C. G. F. Croll and J. K. Speer for help on their respective estates.

# REPORT ON THE SULPHUR-DUSTING OF SMALLHOLDINGS IN 1956/57

By

**Ronald T. Wijewantha**

## **Introduction**

Oidium control by sulphur-dusting of rubber plants is practised in most large and medium sized estates. In smallholdings however the position is rather different. Small-owners can ill-afford to purchase dusting machines. They are also unable to organise themselves into suitable co-operative groups unaided.

To overcome these difficulties and to assist these smallholders and smallowners, a practical and economic dusting scheme was formulated by this Department and tested out on a trial scale in the Kegalla District in 1955 (Reference 1). The results obtained were encouraging. This scheme was therefore suitably amended and tried out on a much larger scale to cover 1,632 acres in 313 smallholdings, in 1955/56 (Reference 2). This trial too was an unqualified success.

In brief, this scheme consisted of dusting machines and supervision being supplied free-of-charge by the Rubber Research Institute, while owners were required to form themselves into co-operative "groups" and carry out the work themselves bearing all other expenses. (Reference 2).

In view of the success of the scheme in the last two dusting years, Government decided to extend facilities for dusting of smallholdings in 1956/57. And for this purpose an additional 15 dusting machines making a total of 33, were placed at the disposal of the Smallholdings Advisory Officer.

## **Organisation**

Sulphur-dusting in 1956/57 was organised on practically the same lines as in the previous trial year. The proposed scheme was advertised in the Press and by a leaflet in English and Sinhalese in October, 1956, and applications were received from a number of newly formed groups representing all Rubber Growing Districts.

The number of new machines allocated at the start was only 5, but as the response from smallholders was found to be encouraging, this number was increased to 15. The money to purchase these machines was kindly loaned by the Rubber Controller from his Rubber Control Fund. As it was considered desirable to have a few machines as stand by in case of break down and emergencies, the scheme in 1956/57 was confined to the use of 30 dusting machines, distributed among 30 "Co-operative Groups." The balance 3 reserve machines were issued to the District Field Officers.

In all, applications from 38 provisionally formed groups were received (Table I).



**Table 1**

District	No. of Groups Tentatively Formed	No. of Groups Which Functioned
Colombo	9	8
Kalutara	8	8
Kegalla	7	3
Ratnapura	6	5
Galle	5	4
Matara	3	2
<b>TOTAL</b>	<b>38</b>	<b>30</b>

The question of allocating the 30 available machines was then taken in hand. Every one of the co-operative groups formed was anxious to be allocated a machine, and it was finally decided to give priority to the following:—

- (1) Groups with the largest acreages.
- (2) Groups which had functioned as such in previous dusting years.
- (3) Groups in which dusting of a suitable acreage was practicable on account of accessibility and adjacent holdings.

In a few cases the proposed dusting groups were first inspected by the author before final allocation of the machines. Annexure 1 shows the distribution of the 30 groups which finally took part in sulphur-dusting. In one case, a group with a fairly small acreage, on being informed of our inability to allocate them a dusting machine, decided to purchase a machine on their own. The necessary advice and technical supervision however was undertaken by this Department.

The training of supervisory staff was begun immediately thereafter. The District Field Officers and Rubber Instructors of the Northern Sector were given a training and detailed instructions under the author's supervision at Ingiriya on 8-12-56, and those of the Southern Sector a similar training at Kahatuduwa on 14-12-56. The labourers and owners of smallholdings in these two groups were incidentally trained at the same time.

The local Rubber Instructor then commenced the training of the labourers, etc. of his group by practical demonstrations. Demonstration sulphur and the dusting machines were distributed by departmental lorry during the second week in December. The Range Rubber Instructors were required to complete training of labourers in their groups by 22nd December. They were also issued detailed instructions from this office. (Annexure 2). By this means all was more or less ready for commencement of dusting when refoliation set in.

### **Sulphur**

Considerable difficulties were encountered in our attempts to purchase in time sulphur dust of a suitable grade for distribution among the co-operative groups.

An acute scarcity of sulphur dust was experienced. This was due to several reasons such as shipping difficulties due to the Suez crisis, a Longshoremen's strike in the U.S.A., congestion in Colombo port and various other factors. As a result various adjustments have had to be made.

The District Field Officers and Rubber Instructors were requested to keep a careful watch on defoliation and forward weekly forecasts on wintering to this office (Annexure 2). The small quantity of sulphur which was available to commence with, was doled out on the basis of these reports. Most Dusting Groups were therefore issued with only half their requirements of sulphur at the start. These groups as well as the groups with late defoliation were issued the balance sulphur when fresh stocks arrived in early 1957. Had it not been for the early action taken by this Department there was every chance of a break down in the entire scheme. The early booking of sulphur from different sources and the arrangements regarding issue of sulphur in limited quantities and only as the necessity arose, enabled us to cope satisfactorily with the situation.

### **Dusting**

Wintering in 1956 was found to occur at more or less the usual time. A careful watch was kept and the first holding to require dusting—*i.e.* when the green buds on the leafless twigs were just beginning to sprout on approximately 10 per cent of the trees in a holding—was at Talangama. This land was selectively dusted on 20th December. Thereafter dusting in the other groups followed in rapid succession.

Each holding was normally given five dustings at weekly intervals at the rate of 12 lbs. of sulphur dust per acre per dusting. In holdings with uneven wintering however, the number of dustings varied, and 6 and sometimes even 7 dustings were necessary. The quantity of sulphur used however did not exceed the 60 lbs. per acre allocated. This was made possible by adjusting proportionately the amount of sulphur dust for each dusting round according to the number of trees requiring actual dusting.

The first group to complete dusting was the one at Matugama where all work was concluded on 25th February, 1957. The last to finish was the Dompe Group which completed its last round of dusting on 27th March, 1957.

The Assistant Advisory Officer, District Field Officer or Rubber Instructor in charge was required to supervise personally the first round of dusting in each holding in a group. They were also requested to supervise the 2nd round of dusting as well wherever they thought further guidance was necessary. Thereafter Rubber Instructors exercised general supervision of further dusting rounds. In a few cases such as that at Gampaha, due to very unsatisfactory organisation, the Rubber Instructor had to personally supervise even the later rounds.

On the advice of the Director, dusting was commenced as early as possible and completed by 7 a.m. each day before the sun's rays were hot enough to dry up the film of dew on the surface of the leaves. Dusting was continued till 9-30 a.m. only under exceptional circumstances. To cope with this requirement it was found necessary in most groups to commence dusting at about 2 a.m. as in larger estates. Such early operations however do not appear to suit smallholdings which have no proper paths.

While in the previous year according to reports "smallholders had invariably been present during the dusting of their own holdings," a marked apathy was noticeable in 1956/57. This may have been mainly due to the very early dusting hours. Only a few owners had co-operated with the officers, most of them were



found sleeping comfortably while the officers were dusting their holdings. The labourers handling the machine gained competence within a short time. But to ensure consistently efficient dusting however trained supervision appears to be desirable.

Transport of machines from holding to holding was usually by hiring cars. In a few cases Group Organisers assisted with their own cars. In one group (Pitigala) transport was by cart, and manual in several others with holdings close together.

A total of 3,119 $\frac{3}{4}$  acres in 704 holdings were dusted in the 1956/57 season. **This constitutes the largest acreage of smallholdings to be dusted in one season.**

### Summary

No. of holdings	...	704
No. of acreage dusted	...	3,119 $\frac{3}{4}$
No. of dusting groups	...	30
No. of acres per machine (av.)	...	104
Size of smallest holding	...	$\frac{1}{2}$ acre
Size of largest holding	...	34 acres
Average No. of holdings in groups	...	23
Average size of each holding	...	4 $\frac{1}{2}$ acres

The individual holdings varied in size from  $\frac{1}{2}$  acre (smallest) to 34 acres the largest. Wherever possible the formation of groups with holdings preferably below 10 acres was encouraged. On an average 104 acres were dusted per machine. This may be considered about the maximum acreage which could be covered by a single machine in dusting small and scattered holdings.

The number of holdings in a single group varied from 6 to 52. The average size of each holding was 4 $\frac{1}{2}$  acres. Most of the Rubber to be dusted was budded Rubber—2,319 $\frac{3}{4}$  acres. In addition 197 acres clonal and 603 acres ordinary but economic Rubber were also dusted. The attached chart (annexure 3) summarises the dusting work in 1956/57.

In regard to distribution of dusted acreages in the various districts, the largest acreage was in Kalutara (991 $\frac{3}{4}$  acres) and the least in the Matara district (175 $\frac{3}{4}$  acres) (See Annexure 4 and Table II).

**Table II**

DISTRICT	ACREAGE	
	1955/56	1956/57
Colombo	348 $\frac{1}{4}$	852
Kalutara	457 $\frac{1}{2}$	991 $\frac{3}{4}$
Ratnapura	224 $\frac{1}{2}$	501
Galle	293	374 $\frac{1}{2}$
Kegalla	156 $\frac{1}{4}$	224 $\frac{3}{4}$
Matara	153 $\frac{1}{4}$	175 $\frac{3}{4}$
<b>TOTAL</b>	<b>1,632<math>\frac{3}{4}</math></b>	<b>3,119<math>\frac{3}{4}</math></b>

## Costs

Sulphur was purchased at an average price of Rs. 472/- per ton and was issued to the groups at the same rate. The over-all cost per acre, on the basis of figures supplied by the Group Organisers averaged Rs. 18/09 (Annexure 5) compared with Rs. 17/97 in 1955/56. This very small increase can be accounted for by the increase in cost of sulphur. Sulphur was available at the slightly lower price of Rs. 450/- per ton in 1955. If the price of sulphur remains stable, the cost of dusting an acre of smallholding would therefore be expected to cost round about this figure in future years as well.

## Weather and Incidence of Oidium

Weather conditions were generally suitable for sulphur-dusting during the major dusting period. Towards the latter part however *i.e.* from about 20th February onwards, dusting was interrupted in several groups by occasional and scattered showers.

On the whole **Oidium** infection this year was about the same as last year.

## Dusting Machines

In all 20 Kestrel and 10 Mistral dusting machines were issued among the 30 dusting groups. The Mistral Machines on the whole were found to be more handy and satisfactory for dusting of smallholdings. Though the Kestrels were lighter and therefore more economic—(3 labourers for carrying a machine against 4 for a Mistral)—they failed to stand up to the strain. The majority of the field officers were in favour of working with Mistrals.

## Results

Sulphur-dusted holdings showed significantly beneficial results, and generally a marked difference could be noticed between dusted and undusted holdings. A large proportion of the dusted areas, particularly those which refoliated early showed very slight or no spotting of the leaf-blades. In these no leaf-fall at all was caused by Oidium. Those which wintered late and caught the full force of infection towards the end of February, suffered slight leaf-fall and spotting. In these, as stated earlier, wet weather which prevailed immediately after dusting, was a contributory factor. However in almost all cases undusted holdings showed much heavier and more serious damage by spotting and leaf-shed. Practically all dusted areas were personally inspected by the author at the conclusion of dusting.

To obtain a general picture and the opinion of individual smallholders, a questionnaire was sent to all Group Organisers and Rubber Instructors in charge of groups. They were required to obtain and forward a reply in respect of every individual holding in their group. The questionnaire and summary of their replies received is attached as Annexure 6.

In the case of all 704 holdings, adjacent undusted Rubber had shown more Oidium. 604 of the dusted holdings were 100-95% free of Oidium. Only 3% of the dusted holdings showed Oidium infection of over 10%. And in 97% of the dusted holdings, leaf-fall due to Oidium was less than 5%. Almost all small-owners expressed their desire to join this scheme and get their holdings dusted next year as well.



## **Practical Difficulties and Suggestions for Future Dusting**

In view of the proposed dusting scheme for 1957/58 according to which it is expected that sulphur-dusting facilities will be extended to smallholders in all Rubber areas in the Island, steps should be taken to overcome the following practical difficulties which became apparent as dusting operations progressed:

- (a) **Group Organiser:** Although Group Organisers were appointed, very few shouldered their responsibilities. They were mere figure-heads and the burden of work fell on the Rubber Instructors (in charge). An ideal Group Organiser would have lessened the work of the Rubber Instructors. The Group Organisers were however suitable custodians of the money collected. This is desirable as it is not in the best interests of this Department for field officers to be in charge of public funds.

Under the circumstances it would be suitable for a "machine operator" to be appointed for each group. This skilled labourer unlike the Hony. Group Organiser will be paid (by the Group) at a slightly higher rate than the ordinary labourer. He will be given a thorough training by this Department and will then hold himself responsible to the Group Organiser and Rubber Instructor for the proper maintenance of the machine and proper dusting operations throughout the dusting period. This will relieve the Rubber Instructors considerably and so enable them to devote more time to the newer groups which will be formed from year to year.

- (b) **Other Costs:** The three principal items of expenditure in dusting of smallholdings are:—

- (1) Cost of sulphur
- (2) Cost of Labour
- (3) Transport of machines during dusting from holding to holding.

A deposit of Rs. 15/- per acre is usually collected from each applicant through his Group Organiser against the value of dusting sulphur to be supplied by the Smallholdings Department. In the case of the other two items, no such collection is made before dusting is commenced. It therefore usually, happens that the Group Organiser has to advance the costs of items 2 and 3 and later recover the money from the individual members. This has however more often than not proved difficult.

As a result it becomes rather difficult to persuade the correct type of person to become a Group Organiser.

It is therefore suggested that in future years, in addition to the money for sulphur a sum of say Rs. 5/- per acre be collected in advance to meet "other expenses".

## **ACKNOWLEDGEMENTS**

I wish to place on record the excellent work done by my field staff who were engaged in this useful and important task. Their work was exacting, and in most cases even the formation of the groups was entirely due to their efforts. These officers were required particularly during the first and second dusting rounds to be up by 2 a.m. every morning. They did their job of work uncomplainingly and efficiently. I have also received several unsolicited letters from Group Organisers testifying to the excellent work done by these officers.

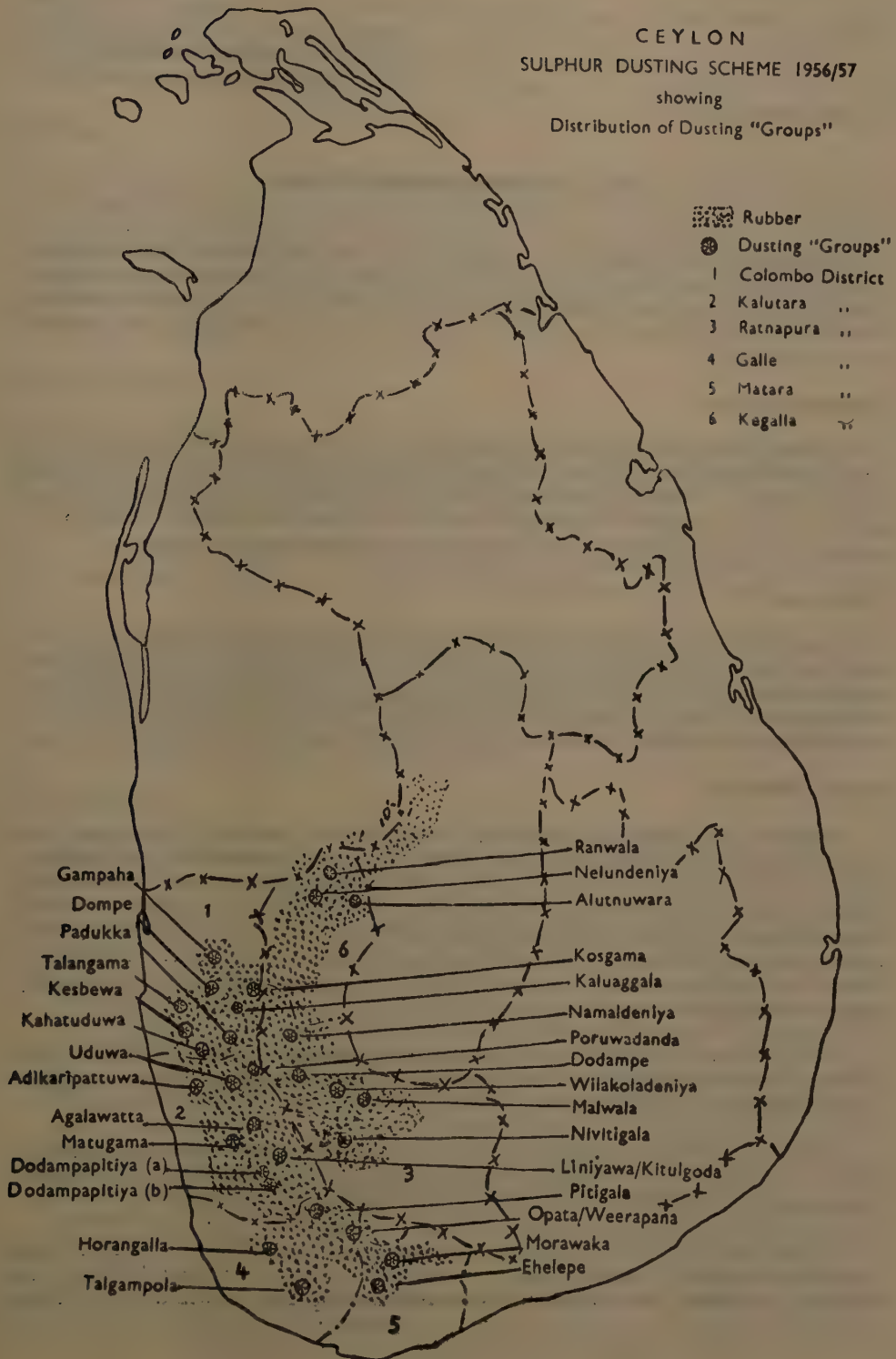
My thanks are also due to Messrs. A Ranatunga and C. Jayasinghe of my office staff for their assistance in the preparation of the maps and charts.

### **Reference**

1. Rubber Research Institute Combined Quarterly Circulars for 1955—  
Volume 31—Parts 3-4.
2. Rubber Research Institute Combined Quarterly Circulars for 1956—  
Volume 32—Parts 1 & 2.



CEYLON  
SULPHUR DUSTING SCHEME 1956/57  
showing  
Distribution of Dusting "Groups"



My No. 121/SD/57.  
14th December, 1956.

**To All Field Staff.**

### **1956/57 Sulphur-Dusting Scheme**

Arrangements for dusting 30 "Groups" have now been finalised and 30 dusting machines have been issued along with the sulphur for demonstration purposes. Rubber Instructors should examine the dusting machines and equipment carefully, read the instruction booklets, and get acquainted with the machines so as to obtain the best results.

#### **Demonstrations**

Dusting demonstrations to the members of the individual groups should be completed by 22nd instant. A thorough training is vitally important for the success of this scheme. Please arrange and supervise this work carefully and see that all parties are well versed in dusting by about the 22nd December. I should be informed in time of the venue for the respective dusting demonstrations.

#### **Wintering**

Each Rubber Instructor should from now on keep the closest possible watch on wintering, and should keep me informed once a week till the first signs of wintering and thereafter twice a week. The holdings in each "Group" that are most advanced in this respect should be watched extra carefully. District Field Officers and Assistant Propaganda Officers should keep in close touch and guide Rubber Instructors.

#### **Actual Dusting**

Rubber Instructors must accompany the machine personally throughout the first dusting on each holding. On any particular holding where they think further guidance is necessary they should supervise the 2nd dusting as well. Thereafter, they can supervise the dusting at different places on different days without devoting their full time to this work. But they must see that the dusting is satisfactorily done on each and every holding. Assistant Propaganda Officers and District Field Officers should make arrangements for one of them to be present during the first dusting round in each group.

Five dustings at weekly intervals should be enough for each holding. But where selective dusting is done, dusting should be continued till the quota of sulphur for that holding is completely used.

Please note that the availability of holidays will be subject to dusting exigencies. That is, if any particular holding has to be dusted on these days officers must remain on duty. They will, however, be allowed this leave as lieu leave later.

Please note to start dusting when the green buds on the leafless twigs are just beginning to sprout on approximately 10 per cent of the trees of each holding. At this stage, of course, you will only do **selective** dusting, *i.e.* you will dust only those

trees that are ready but not the others and, therefore, you will not use the full quota of sulphur for say the first two dustings. In this way you can give even more than five dustings per holding without using more than the allotted quota of sulphur. From then on weekly dusting should be continued.

## **Sulphur**

Due to freight difficulties, sulphur dust this year may be available for issue very late, actually only about a week before dusting is due. In fact it may be possible for me to give you the dust only in **two** instalments. Wintering forecasts are therefore very important. I shall be issuing the sulphur to a particular group when I receive a wire from the Rubber Instructor in charge that dusting has to be commenced in a week from date. The order for the sulphur will then be posted to the Group Organiser.

## **Dusting Hours**

Commence dusting as early as possible and complete not later than 7 a.m. before the sun's rays are hot enough to dry up the film of dew on the surface of the leaves. Only under exceptional circumstances should dusting be continued till 9-30 a.m. In this connection our Director comments as follows:—

“The best results of sulphur dusting are obtained when the leaves are covered with a film of dew to which the fine sulphur dust sticks easily.

The best conditions for Oidium control are therefore obtained in the early hours of the morning, ideally not later than 7 a.m. and before the film of dew on the leaves is dried by the sun. Although for practical reasons and under certain conditions the time limit may be extended to 9-30 a.m. the results of the dusting operation cannot be expected to be as good as when the operation is done earlier in the morning before sunrise.”

## **Organisation**

Rubber Instructors should discuss with the Group Organisers the following points before dusting proper begins:—

- \*How each Group intends to transport the dusting machine from one sub-group to another.
- \*Whether they will have one set of labourers for carrying the machine throughout the season. In which case one extra labourer will always be necessary to carry sulphur and relieve one labourer when tired.
- \*All costs of sulphur, transport of sulphur, labour employed during training and after, petrol and engine oil for machine etc., are items payable by each group.
- \*The only items that will be paid by this Department are for the transport of dusting machine from Colombo to each range and the transport of one bag of sulphur for training.

Please note that all arrangements for commencing actual dusting should be finalised by the third week of December.



### **Spare Dusting Machines**

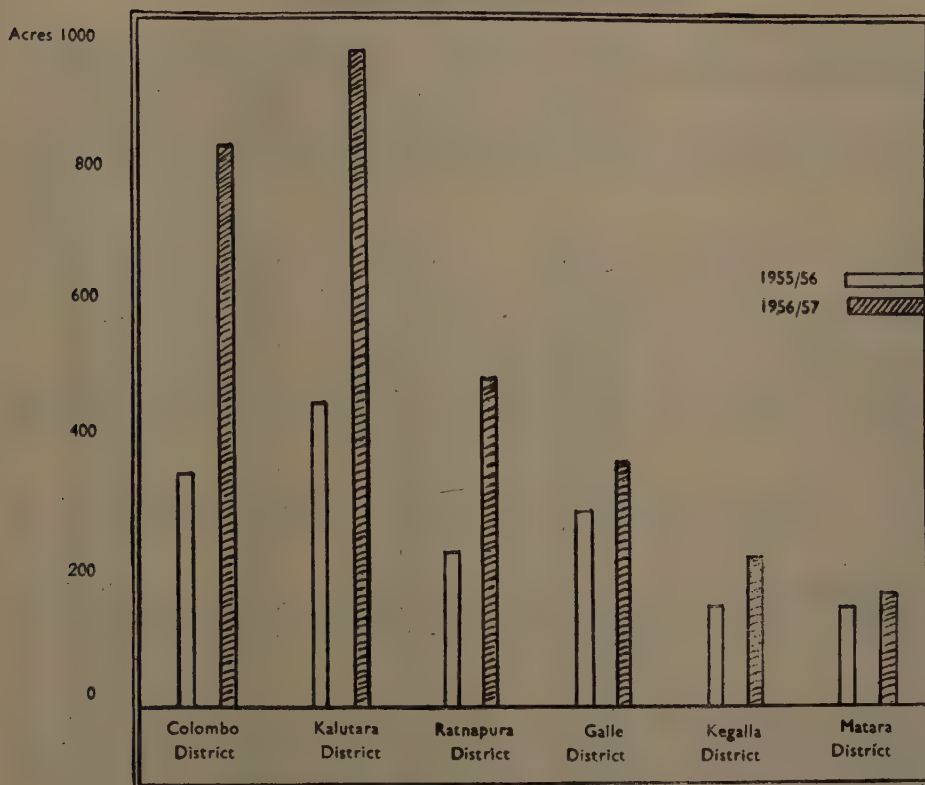
Application for spare dusting machines should be made to me and your District Field Officer, in the event of any mishap or break down, without any delay, but only if it is impossible for the machine to be set to right locally. Please see that the groups take great care of the machines. **Spares are limited.**

I request my field staff's co-operation to make this scheme a hundred per cent success and also to keep the "Groups" sufficiently interested and as friendly compact units, in order that the same "Groups" could function as such in the following year as well. So that actually if necessary Rubber Instructors could form an equal number of new groups in the next season.

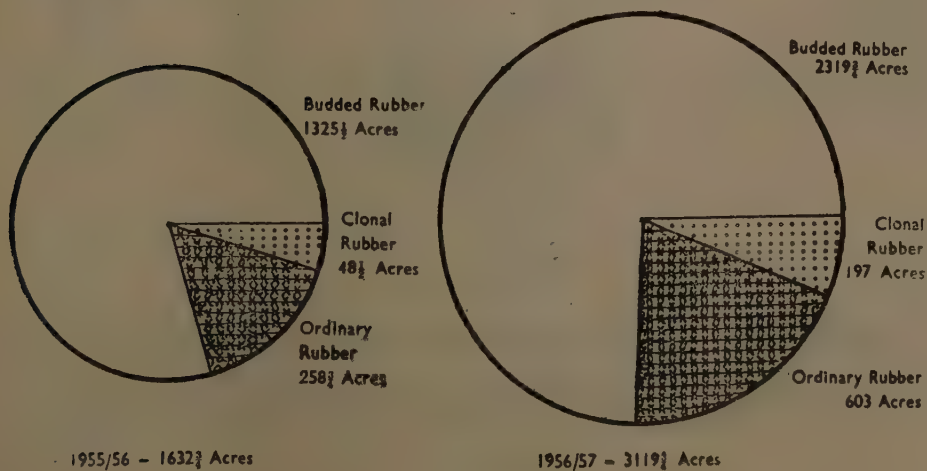
Sgd. RONALD T. WIJEWANTHA.  
*S.H.P.O.*

ANNEXURE 4

PROGRESS IN SULPHUR DUSTING OF SMALLHOLDINGS  
1955/56 - 1956/57



RUBBER ACREAGES SULPHUR - DUSTED - CLASSIFIED ACCORDING TO KIND OF RUBBER



## Cost of Sulphur and Labour

	Cost per Labourer per day Rs. Cts.	Cost of Sulphur per acre Rs. Cts.	Cost of Balance items per acre Rs. Cts.	Total cost of Scheme per acre Rs. Cts.
Gampaha	3.50	13.12	5.44	18.56
Talangama	2.50	12.66	5.25	17.91
Uduwa	3.50	13.41	7.49	20.90
Adikaripattuwa	3.50	13.40	4.96	18.36
Agalawatta	3.00	13.03	5.42	18.45
Matugama	3.00	12.61	3.35	15.96
Padukka	2.50	12.65	5.75	18.40
Kahatuduwa	3.50	12.96	4.21	17.17
Kesbewa	3.50	12.94	4.25	17.19
Dompe	3.50	12.99	4.21	17.20
Ehelape	3.50	13.20	4.75	17.95
Morawaka	3.00	13.20	5.00	18.20
Opata/Weerapana	3.00	12.57	5.62	18.19
Talgampola	2.50	12.60	3.59	16.19
Horangalla	2.50	13.47	5.27	18.74
Pitigala	3.00	13.37	4.45	17.82
Dodampapitiya A	2.75	12.69	4.46	17.15
Dodampapitiya B.	2.75	12.69	4.35	17.04
Kitulgoda/Liniyawa	2.75	12.69	6.70	19.39
Ranwala	3.00	12.65	6.72	19.37
Nelundeniya	2.50	12.58	5.67	18.25
Aluthnuwara	2.50	12.58	6.06	18.64
Nivitigala	2.50	12.52	5.03	17.55
Namaldeniya	3.00	12.89	6.55	19.44
Dodampe	2.50	12.50	3.01	15.51
Wilakoladeniya	3.00	12.72	5.42	18.14
Malwala	3.00	12.77	6.92	19.69
Poruwadanda	3.00	13.30	6.50	19.80
Kosgama	3.00	12.97	4.74	17.71
Kaluaggala	3.00	13.89	4.12	18.01

AVERAGE 4.97 18.09



## PLANTING TOPICS AND QUESTION CORNER

Under this heading we propose to give in each future issue of this Journal short notes on subjects of topical or general interest and to answer queries which we hope will be forthcoming from our readers, whose names and addresses need not be disclosed.

We give in this issue a note on two subjects which should prove useful to Planters.

### **Planting Out Rubber Seedlings from Germination Beds:**

The germination medium should consist of loose friable loamy soil which does not compact with frequent watering or of river sand. The germination beds are shaded and are usually raised at least six inches to ensure free drainage. They should not be more than 3 feet wide so that all seeds are within easy arm reach.

The fresh seeds collected at the time of seed fall are laid out in a single layer on the surface almost touching one another and with the flat side downwards. They are firmly pressed into the bed, thinly covered and are watered daily.

The seeds may also be laid on a bed of coir dust contained in a shaded wooden frame provided with a wire netting cover to exclude rats and covered over by a coir matting which is conveniently rolled back to allow daily inspection of the seed.

After five or six days the seeds should be inspected daily and those showing growth of the young root are removed from the germination bed and are taken to the planting beds in shallow baskets. The seeds which on examination are found to be ungerminated are carefully reset in the germination bed and lightly covered. This daily examination may be carried out for about three weeks.

The best and safest stage at which to plant out the germinated seed is when the young root is not more than half an inch long (see diagram) and before the lateral roots of the main whorl or the young shoot have started to develop. Transplanting when the germination is more advanced increases the risk of damage to root and shoot and is a common cause of runts and forked taproots. With seeds planted out at this early stage of germination there is no need for shading.



Best stage for planting out  
germinating seed.

E. D. C. B.

### **Pre-Treatment of Cover Crop Seed for Quick Germination:**

The germination rate of cover crop seed can be greatly accelerated by softening the seed coat and making it more permeable to water which is essential for germi-

nation. Seed which would normally remain dormant in the soil for a considerable time are made to germinate rapidly.

### **Acid Treatment:**

One way of achieving this result is by acid treatment which consists in soaking the seed in **concentrated sulphuric acid** for a prescribed period.

This is best done in practice by placing the seed in a glass vessel, say a 4-gallon carboy, and pouring in enough concentrated sulphuric acid to cover them. The seeds are stirred by a rotating motion of the carboy for about fifteen minutes after which as much as possible of the acid is poured off and water added through a hose pipe, at first carefully in order to avoid dangerous spurting and overheating. The tap is then turned on to its full extent and with the free end of the hose pipe placed well down in the carboy water is allowed to run out of the mouth of the carboy for a few hours to wash off all traces of the acid, and to soak the seed.

By this method it was found in Malaya that seed which may give 30 per cent germination over 4 weeks will give over 80 per cent germination in 3 to 4 days.

**Operators must be warned that concentrated sulphuric acid is very corrosive and dangerous to handle.**

### **Hot Water Treatment:**

Another way of accelerating germination of cover seed is by hot water treatment. This may be done by placing the seed in a waterproof tin container, such as a small latex collecting bucket, adding water to the brim and placing the container in a smoke house (where the temperature may vary between 50° and 55° Centigrade) overnight or until the seeds have swelled up.

With this method of treatment the percentage germination may be increased from, say, 30 per cent in 4 weeks to about 50 per cent in one week.

It is therefore less effective than the acid treatment but is probably safer for normal estate use.

**E.D.C.B.**

### **QUESTION CORNER:**

An example of a typical question and answer from our Advisory Correspondence is given below:—

**Question:** I notice from the article on pages 28 to 35 of the Combined 3rd and 4th Quarterly Circulars for 1956 that adhesion between the bales of RSS are minimised by means of a talc mixture and I would like to know whether in hot weather talc could be dusted on to sole crepe to prevent adhesion.

**Answer:** We regret that we cannot encourage the use of talc as a means of limiting the self adhesion of sole crepe. Information received from the British Rubber Producers' Research Association indicates that the Shoe and Allied Trades Research Association has recently complained on behalf of one of its members of the trouble caused by thin sole crepe having been dusted with talc instead of being interleaved with paper to prevent adhesion. The use of talc necessitated a solvent dip before plying.

**E.J.R.**

## RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 151st meeting of the Rubber Research Board held in the Board Room of the Tea Controller's Office, Eastern Bank Building, Fort, Colombo, at 2-30 p.m. on Monday, 15th July, 1957.

*Present:*—Mr. S. Pathmanathan (in the Chair), Senator Thomas Amarasuriya, O.B.E., Mr. H. St. J. Cole-Bowen, Mr. W. P. H. Dias, J.P., Mr. G. H. Dulling, Mr. Errol A. Jayawickrema, J.P., U.M., Mr. V. T. G. Karunaratne, M.P., Mr. H. E. Peries (Acting Deputy Secretary to the Treasury), Dr. E. D. C. Baptiste (Director) and Mr. C. D. de Fonseka (Administrative Secretary).

Apologies for absence were received from Dr. M. F. Chandraratne (Director of Agriculture) and Mr. B. Mahadeva (Rubber Controller).

### 1. Board:

(a) *The Late Mr. R. H. Wickremasinghe*—A vote of condolence was passed on the death of Mr. R. H. Wickremasinghe, C.C.S., Deputy Secretary to the Treasury, who had been associated with the Board since 1951.

(b) *Change in membership*—The following changes were reported:—

1. Mr. H. E. Peries, C.C.S., Acting Deputy Secretary to the Treasury, had been nominated by the Hon'ble Minister of Finance to serve on the Board in place of the late Mr. R. H. Wickremasinghe, with effect from 31-5-1957.
2. Mr. H. St. J. Cole-Bowen had been nominated by the Planters' Association of Ceylon to act for Mr. G. H. Carter during the latter's absence from Ceylon, with effect from 29-6-1957.

### 2. Minutes:

(a) *Confirmation*—Draft minutes of the meeting held on 28th May, 1957, which had been circulated to members, were signed by the Chairman.

(b) *Matters arising from the minutes*—

1. *District Field Officers, S.H. Department*—The promotions of Messrs. L. A. Wijesinghe, Rubber Instructor, Kosgama, and M. B. Dissanayake, Rubber Instructor, Mawanella, as District Field Officers, with effect from 1st August, 1957, were approved.
2. The nomination of Mr. O. de Alwis to serve on the Assistant Staff Medical Fund Committee was approved.

### 3. Administrative Committee:

The recommendations made by the Committee at its meeting held on 29th June, 1957, were approved as follows:—



- (a) *Water and Power Supply for Assistant Superintendent's Bungalow at Hedigalla*—A supplementary vote was passed to cover the additional cost of the building, water and power supply and approach road, as recommended by the Committee.
- (b) *Visiting Agent's Report*—The report was approved and an additional vote was passed to cover the cost of planting the unplanted area of 10 acres in the 1956 clearing.
- (c) *Plant Breeder*—The arrangements made for the assignment of a Plant Breeder to the Institute were noted.
- (d) *Director—Overseas Leave*—The proposed arrangements regarding the Director's overseas leave and acting arrangements during his absence, as recommended by the Committee, were approved.

Arrangements regarding the Director's visit to America were also approved as recommended by the Committee.

- (e) *Agronomist—Overseas Leave*—In view of the Committee's recommendation that the period of contract of overseas officers be reduced to two years it was agreed that Mr. D. H. Constable's present contract should terminate on 15th December, 1957. He would then be eligible for four months leave.
- (f) *Tenders for Buildings*—As recommended by the Committee, the following decisions were arrived at:—

Extension to Plant Pathology Department Laboratory—Accept tender of Messrs. Geophil & Sons.

General Store —Arrange for a modified plan to be prepared.

2 Assistant Staff Bungalows }  
Double Cottage } —Accept tenders of  
Single Cottage } Mr. L. Thomas  
Silva.

- (g) *Phytophthora Experiments in South India*—The Committee's recommendation that Dr. A. Rikkenbach, Plant Pathologist, should visit South India, to witness certain large scale field experiments carried out on certain estates in Quilon for the control of Phytophthora, was approved.

#### 4. Reports:

- (a) *Director's visit to Malaya*—This report was tabled and the Chairman thanked Dr. Baptiste for the valuable information contained therein.
- (b) *Sulphur Dusting of Smallholdings in 1956/57*—The Board expressed its appreciation of the work done by the Smallholdings Department in connection with the sulphur dusting of smallholdings in 1956/57. The S.H.A.O's proposals for an enlarged scheme for the next dusting season were approved and he was asked to proceed with the necessary arrangements regarding the formation of Co-operative groups, etc.

## 5. Staff:

Changes in staff since the last meeting were reported and approved.

## 6. London Advisory Committee:

Minutes of the 9th meeting of the Agricultural Sub-Committee held on 21st March, 1957, were tabled.

## 7. Publications:

The following publications, etc. were tabled:—

- (a) Combined 3rd & 4th Quarterly Circulars for 1956.  
Advisory Circular No. 59A—Magnesium Deficiencies.  
Smallholdings folder No. 4—Sulphur Dusting.
- (b) Advisory Leaflet No. C/57/1 —Fungicides *vs.* Phytophthora Leaf  
Disease Contamination of Rubbers.  
" " " C/57/2 } Abstracts from the Annual Report for  
" " " C/57/3 } 1956 of the Chemical Department.  
" " " PP/57/1 —Notes for the Phytophthora Season 1957.

## 8. Next Meeting:

It was agreed that the next meeting of the Board be held on 23rd September, 1957.

## 9. Rubber Replanting Subsidy Scheme:

In view of a query made by a member it was agreed that the Chairman of the Rubber Replanting Advisory Board be written to to enquire whether, in the event of the Replanting Subsidy Scheme ceasing to function in 1960, subsidies for permits given in 1960 would be paid until the 3rd or 4th year after replanting.

The meeting then terminated.

## RUBBER RESEARCH INSTITUTE OF CEYLON

Minutes of the 152nd meeting of the Rubber Research Board held in the Board Room of the Tea Controller's Office, Eastern Bank Building, Fort, Colombo, at 2-30 p.m. on Thursday, 12th September, 1957.

*Present:*—Mr. S. Pathmanathan (in the Chair), Mr. H. St. J. Cole-Bowen, Mr. W. P. H. Dias, J.P., Mr. G. H. Dulling, Mr. Errol A. Jayawickrema, J.P., U.M., Mr. A. J. Joseph (Acting Rubber Controller), Mr. V. T. G. Karunaratne, M.P., Mr. H. E. Peries (Acting Deputy Secretary to the Treasury), Dr. E. D. C. Baptiste (Director) and Mr. C. D. de Fonseka (Administrative Secretary).

Dr. M. F. Chandraratne (Director of Agriculture) had expressed his inability to attend the meeting.

### 1. Board:

The Chairman welcomed Mr. A. J. Joseph (Acting Rubber Controller) who had been nominated to represent the Rubber Controller during the latter's absence from the island with effect from 22nd July, 1957.

### 2. Minutes:

(a) *Confirmation*—Draft minutes of the meeting held on 15th July, 1957, which had been circulated to members, were signed by the Chairman.

(b) *Matters arising from the minutes*—

1. *Transport service for Staff*—It was reported that the Commissioner of Motor Traffic had authorised the use of a bus between Dartonfield and Matugama as a private coach for the convenience of the officers of the Institute.

2. *Chemist*—It was reported that Dr. E. J. Risdon (Chemist) had returned from overseas leave and resumed duties at the Institute on 1st August, 1957.

3. *Temple at Hedigalla*—A letter from the Estate Workers' Union, Hedigalla, requesting that a block of land at Hedigalla be allocated for the construction of a temple was considered, and it was agreed that the Chairman and Mr. V. T. G. Karunaratne, M.P. should interview the Hon'ble Minister of Lands and Land Development in this connection.

4. *Rubber Replanting Subsidy Scheme*—It was reported that information had been received from the Rubber Controller to the effect that, in the event of the Rubber Replanting Subsidy Scheme ceasing to function in 1960, subsidy payments would continue to be made until 1962 or 1963 to those who are granted permits in 1960.

### 3. Administrative Committee:

The recommendations made by the Committee at its meeting held on 6th September, 1957, were approved.



#### 4. Letter from R.R.I.C. Employees' Union:

In connection with certain requests made by the R.R.I.C. Employees' Union, it was agreed that these be considered by a Sub-Committee.

#### 5. Reports and Accounts:

- (a) *Director's Report for the 1st half year 1957*—was approved.
- (b) *Research Programmes for 1958*—were approved.
- (c) *Estimates for 1958*—The draft estimates, which provide for income and expenditure as follows, were approved:

		Rs.
Estimated income for 1958	...	2,050,991
Estimated expenditure for 1958:		
Recurrent	Rs. 1,742,233	
Capital	„ 964,440	
	—————	2,706,673
Estimated excess of expenditure over income for 1958	... ..	<u>655,682</u>

It was noted that the estimated income for the year had been based on the increased cess rate of 82½ cts. per 100 lbs.

- (d) *Receipts and Payments Account for the 2nd Quarter 1957*—was approved.

#### 6. Staff:

- (a) *Director*—It was reported that the Director would leave Ceylon by air on 13th September. His overseas leave would commence on that date and he would, while in U.K., proceed to America in accordance with arrangements already made for the importation of budwood of certain Hevea clones.
- (b) *Agronomist—Renewal of Contract*—A letter from Mr. D. H. Constable, Agronomist, regarding terms of re-engagement was considered and it was agreed that he be offered re-engagement.
- (c) *Assistant Advisory Officer (North)*—It was reported that Mr. K. Wilson de Silva, Assistant Advisory Officer (N) had returned from leave and resumed duties on 1st August, 1957.
- (d) *Assistant Staff*—Changes in staff since the last meeting were reported and approved.

#### 7. General Matters:

- (a) *Rules and Regulations*—A suggestion made by the Auditor-General that a set of rules and regulations be framed embodying the Board's decisions on financial matters was considered. It was agreed that, for the present, Government Financial Regulations should be followed wherever appropriate.

- (b) *Requests from R.R.I.C. Staff Club*—In response to a request made by the Staff Club it was agreed that a block grant of Rs. 400/- be made to assist the club in purchasing a billiard table and a refrigerator.

**8. Publications:**

The following publication was tabled:—

“Report of the Rubber Research Institute of Ceylon for 1956.”

**9. Next Meeting:**

It was agreed that the next meeting of the Board be held at 2-30 p.m. on Monday, 18th November, 1957.

Before the meeting terminated the Chairman thanked Dr. Baptiste for the good work done by him during his period of office and wished him a pleasant holiday.

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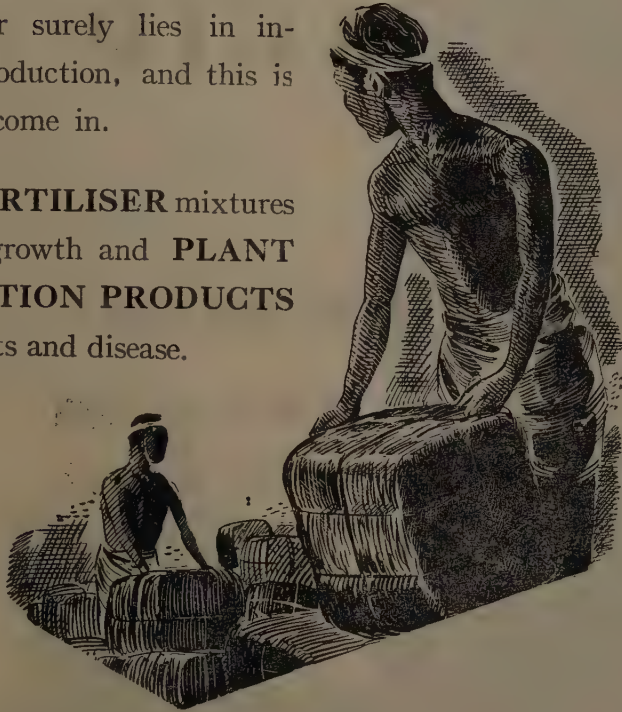
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# MISTRAL II AB

## SULPHUR DUSTING MACHINE

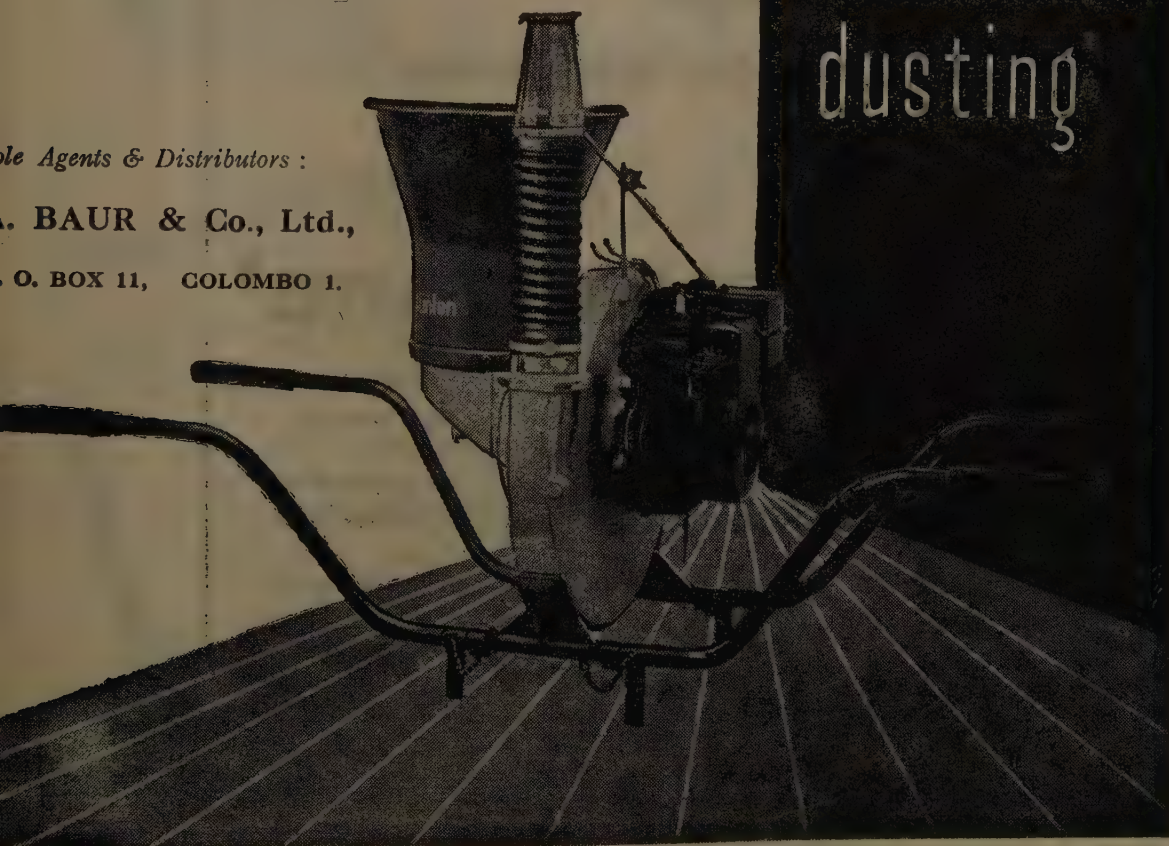
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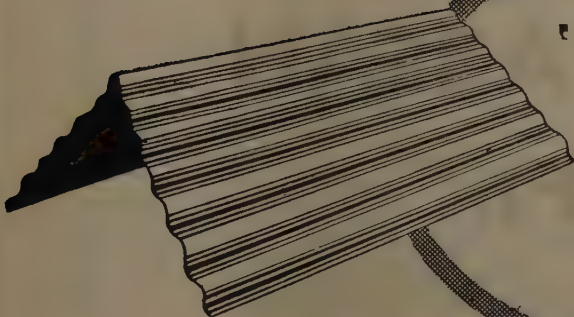
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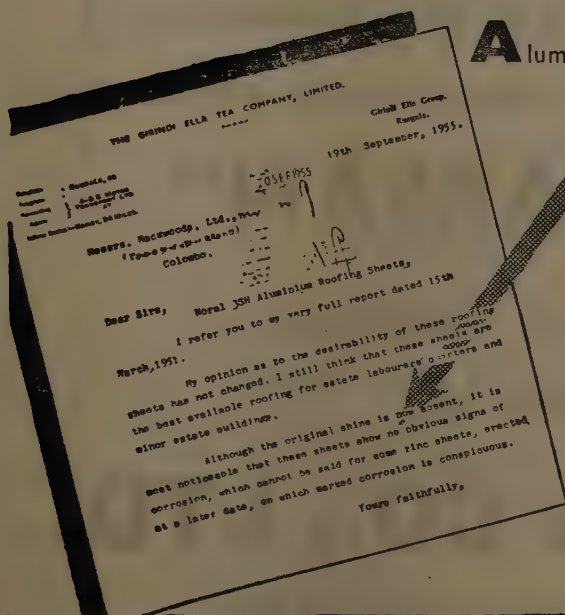
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**Note.**—The Laboratories and Head Quarters Offices of the Institute are situated at Dartonfield Estate, Agalawatta, Telephone No. 26, Agalawatta, Telegraphic Address 'Rubrs' Agalawatta. There are two Experimental Stations, one at Nivitiagalakele, Matugama, and the other at Hedigalla, Latpandura. The Office of the Smallholdings Department is at No. 33, Clifford Place, Colombo 4. Telephone No. 84205, Colombo.

All enquiries and other communications should be addressed to the Director, Rubber Research Institute of Ceylon, Agalawatta.

